

Gina Harrison  
Director  
Federal Regulatory Relations

1275 Pennsylvania Avenue, N.W., Suite 400  
Washington, D.C. 20004  
(202) 383-6423

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September 13, 1995

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF SECRETARY

**EX PARTE**

William F. Caton  
Acting Secretary  
Federal Communications Commission  
Mail Stop 1170  
1919 M Street, N.W., Room 222  
Washington, D.C. 20554

Dear Mr. Caton:

Re: *RM-8643 - Petition for Rulemaking of Pacific Bell Mobile Services  
Regarding a Plan for Sharing the Costs of Microwave Relocation*

Yesterday, the attached study by Professor Paul R. Milgrom of Stanford University was submitted to Robert M. Pepper, Chief, and Gregory Rosston, of the Office of Plans and Policy. Please associate the attached material with the above-referenced proceeding.

We are submitting two copies of this notice in accordance with Section 1.1206(a)(1) of the Commission's Rules.

Please stamp and return the provided copy to confirm your receipt. Please contact me should you have any questions or require additional information concerning this matter.

Sincerely,



Enclosure

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STANFORD UNIVERSITY  
DEPARTMENT OF ECONOMICS  
STANFORD, CALIFORNIA 94305-6072

**Paul R. Milgrom**

*Shirley and Leonard Ely, Jr. Professor  
of Humanities and Sciences*

Phone: (415) 723-3397

Fax: (415) 725-5702

September 1, 1995

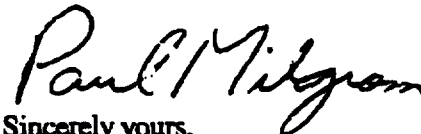
To Whom It May Concern:

I have been asked by Pacific Bell to estimate two kinds of losses that the government and consumers may suffer as a result of the current rules governing microwave relocation. The first is the loss of revenue to the Treasury in auctions for the C, D, E, and F-band PCS licenses resulting from the demands by microwave licensees for premium payments before relocating microwave links. Recent demands from microwave incumbents have called for payments of \$1 million per link, compared to an estimated actual relocation cost of \$200,000 for an average link. Such demands directly reduce the value of the PCS licenses to potential buyers. If recent demands are a fair indication of eventual settlements and if premium costs are shared equally among affected PCS providers, the loss of auction revenues would amount to \$1.9 billion. Smaller demands or compromise settlements could halve the cost to about \$900 million.

The second kind of loss is that suffered by consumers as a result of delays in initiating PCS services. The current rules encourage microwave users to utilize threats of delay to increase their bargaining power, since delays are costless to them but costly to the PCS providers. The loss in consumer surplus from delaying the introduction of PCS services on the A and B bands nationwide, conservatively estimated, amounts to \$55 million per month of delay, while the loss of delays in introducing services in the C band amounts to at least \$11 million per month. Under less conservative estimates, the costs could be several times higher than this.

Additional background for these calculations are provided in the attached statement.

Respectfully submitted,



Sincerely yours,

Statement of Paul R. Milgrom

1. My name is Paul R. Milgrom. I am the Shirley and Leonard Ely, Jr. Professor of Humanities and Sciences and Professor of Economics at Stanford University in Stanford, California, 94305.

2. I received an A.B. degree in Mathematics from the University of Michigan and an M.S. in Statistics and a Ph.D. in Business from Stanford University. My academic specialty is microeconomic theory and comparative economic institutions. From 1990-1994, I was coeditor of the *American Economic Review*. I have also served on the editorial boards of several other economics journals. I am the author of more than sixty books and articles and have been the recipient of numerous awards and honors, including Fellowships in the American Academy of Arts and Sciences and the Econometric Society. I have also received Fellowship grants from the John Simon Guggenheim Foundation, the Center for Advanced Study in the Behavioral Sciences, and the Center for Advanced Studies in Jerusalem. My curriculum vitae is attached.

3. I have devoted considerable time and attention to telecommunications issues, especially ones concerning Personal Communications Services (PCS). Since November of 1993, I have filed nine affidavits or statements with the Federal Communications Commission regarding PCS-related matters, including two that were co-authored with my colleague, Stanford Professor Robert Wilson. I acted as an adviser to Pacific Telesis Mobile Services during the recently completed auction #4 of broadband PCS licenses. In 1994, I filed an affidavit in connection with the motion to terminate the MFJ. In 1984, when the MFJ precipitated a restructuring of certain contracts between AT&T and the Southern New England Telephone Company (SNET), I advised SNET about the renegotiation of its contracts.

4. My other experience with regulatory matters is diverse. It includes testimony given to the Federal Energy Regulatory Commission concerning pricing on the Trans-Alaska pipeline, testimony at trial concerning the economics of the insurance contracting, and written testimony concerning environmental regulation filed with the National Oceanographic and Atmospheric Administration (NOAA).

5. I have been asked by Pacific Telesis Mobile Services (PTMS), the high bidder in auction #4 for the B-band licenses covering the Los Angeles and San Francisco MTAs, to comment on the likely costs to consumers and the government resulting from bargaining with microwave licensees whose operations would suffer interference from PCS operations. These costs include reductions in future government auction revenues and probably also include reductions in consumer surplus resulting from delays in the introduction of PCS services

6. Any such calculations necessarily rest on a forecast of the outcome of bargaining between the PCS providers and the microwave licensees. Data about PCS providers willingness to pay and bargaining postures are confidential and unavailable, so I have had to rely on information about the microwave providers initial demands. A second estimation issue arises from the fact that most existing microwave links are vulnerable to interference from more than one PCS frequency. In those situations, my estimate of the revenue impact on future auctions will depend on how the costs of relocating microwave links will be apportioned among the interfering operations. For these calculations, I have assumed that where multiple services would interfere with a link, any payments to microwave licensees are shared equally among interfering service providers.

### Summary

7. In my opinion, the losses associated with any delay in beginning PCS services caused by negotiations between point to point microwave users and PCS licensees would be very large. The financial demands of microwave users reduce the attractiveness of PCS licenses yet to be auctioned. If the recent demands made by microwave licensees are representative of bargaining outcomes, losses in government auction revenues from sales of the C, D, E, and F-bands as a result of payments to microwave users would total between \$930 million and \$1.9 billion. Delays in delivering PCS service as a result of protracted bargaining are likewise costly. I measure these costs in terms of the loss of consumer surplus resulting in a one-month delay in the service initiation for all licenses in the A and B bands or in the C band. Using the most conservative estimation procedure, losses in consumer surplus accrue at a rate of \$55 million per month of delay for the A and B-band services, and \$11 million per month for the C-band service. Less conservative, but

rather more likely estimation scenarios entail losses many times higher: \$225 million per month of delay for the A and B-bands and \$35 million per month for the C-band.

### **Bargaining with Point to Point Microwave Users**

8. PCS service rules provide that licensees must relocate microwave links with which their services interfere. There are about 4,500 such links in the U.S., affecting all six PCS bands, of which some 3227 affect the C, D, E and F bands. The rules provide commercial microwave users a 2-year voluntary relocation period followed by a 1-year mandatory relocation period. For public service entities there is a 3-year voluntary period followed by a 2-year mandatory period. Many microwaves users are now requesting payments of between \$400,000 and \$800,000 per link above and beyond the provision of comparable facilities to move before the mandatory deadline.

9. The sequential and multilateral nature of these negotiations makes it likely that bargaining will lead to a large amount of lost value for PCS licensees. Fearing that the first settlements will set a precedent for later ones, PCS providers are likely to resist initial demands for extra compensation, while microwave licensees have little or nothing to lose by delaying their relocation. Initial bargaining is therefore likely to be difficult, making costly delays probable.

10. If the rules governing microwave relocation allow the incumbents to extract premiums, bidders for the C, D, E, and F-bands will factor those premiums into their business plans as a cost of initiating service. For example, a company that expects to have to pay premium costs of \$400,000 per link for 100 links to initiate service in some BTA will subtract the \$40,000,000 in premium payments in calculating the value of the license. Its maximum price would be correspondingly reduced. Since it is the maximum price of the bidder with the second highest value that determines the auction price, the net result would be a \$40,000,000 reduction in the price for this individual license. Assuming that the microwave licensee negotiates a premium payment of \$400,000 to \$800,000 per link in addition to the direct relocation costs and that the premium cost for each link is shared equally among the PCS licensees whose services would interfere, and recognizing that 3,227 links interfere with the C, D, E, and F-bands nationwide, I expect that the

total auction prices of the licenses in the C, D, E and F bands would be reduced by \$930 million to \$1.9 billion.<sup>1</sup>

### Consumer Surplus Computations<sup>2</sup>

11. The largest cost of any delay in instituting PCS services would be borne by consumers in the wireless industry, for whom access to PCS services would be delayed and who would pay higher prices for cellular services due to the absence of PCS competition. Estimates of the loss of consumer surplus per month from delayed entry depend on assumptions about the nature of competition and the effectiveness of regulation in the industry, as well as on forecasts of demand. However, even the most rough-and-ready estimates show that the cost is very large. Currently, cellular service is provided by what is essentially a duopoly. If the introduction of the PCS A and B-band competitors into the wireless services market led to price reductions of just 10% with no consequent expansion in demand it would still increase consumer surplus by an amount equal to 10% of the existing industry revenues. As of the summer of 1994, annualized industry revenues amounted to approximately \$6.5 billion,<sup>3</sup> leading to an estimated gain for consumers of \$650 million per year. Similarly, if entry of the C-band provider led to price reduction of 2%, the estimated gain for consumers would be \$130 million per year.

12. The preceding estimates, however, are probably too low. Because even conservative assumptions about demand can lead to very large estimates of the loss of consumer surplus from delayed entry, I have constructed my estimates using conservative assumptions about demand. First, despite the persistent growth of demand recently experienced and forecast by almost every pundit, I assume that the scale of the wireless market is fixed at the level attained in the summer of 1994. Second, despite estimates which show that demand for wireless services has tended to be quite

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<sup>1</sup>This calculation uses information supplied by Pacific Bell Mobile Services about which particular PCS bands would interfere with each particular microwave links.

<sup>2</sup>These calculations incorporate and extend the ones in my statement to the FCC of May, 1995.

<sup>3</sup>*The Wireless Communications Industry*, Donaldson, Lufkin & Jenrette, Winter 1994-1995.

inelastic, I assume that wireless service demand has unitary elasticity, which is the average elasticity for all products in the economy.<sup>4</sup> Third, in order to focus on the beneficial effects of competition for consumers, I assume that there is an absence of regulation that either raises or depresses prices. Finally, I assume that the parties have equal costs and engage in Cournot competition, which is a moderate and widely used specification of the intensity of competition among wireless providers.

13. With these assumptions, the eventual effect on consumer surplus of increasing the number of competitors in a market from two to four -- the entry of the PCS A and B-band licensees -- would be a fifty percent (50%) increase in the volume of wireless calling, a thirty three percent (33%) reduction in the prices of wireless services, and an increase in consumer surplus of approximately \$2.7 billion per year. The entry of a fifth competitor, the C-band licensee, would increase volume by an additional seven percent (7%) and lower prices by an additional six percent (6%) leading to an increase in consumer surplus of approximately of \$420 million per year. Delaying the day when these new entries occur amounts to delaying the time at which consumers first begin enjoying this enormous benefit.

14. The preceding calculation has assumed that the market adjusts immediately to the entry of new competitors and that the size of the market at the time of entry is the same as its current size. More realistically, we would expect a delayed adjustment and a growing market. If, as expected, the rate of growth in the relevant future period exceeds the real rate of interest, then accounting for both of these effects would further increase the consumer surplus estimates.

15. It is most likely that, if the rules remain unchanged, both of the kinds of costs described in this memorandum will be incurred. There will certainly be a loss of auction revenue to the

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<sup>4</sup>In an affidavit to the Commission dated September 14, 1994, Professor Jerry Hausman estimated the price-elasticity of demand to be -0.402 with a standard error of .155. As the customer base for wireless services expands, demand may become more elastic. Since more elastic demand leads to lower estimates of the additional consumer surplus from increased competition, I have used such an estimate here.

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government amounting to hundreds of millions, or perhaps billions of dollars. In addition, there will probably be a loss of consumer surplus amounting to hundreds of millions of dollars.

Respectfully submitted,

  
Paul R. Milgrom